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1. Scope:

This procedure describes the methods used to assemble the coil with end plate and yoke stacking assembly for RHIC Helical magnets.

2. Applicable Documents:

RHIC-MAG-Q-1004	Discrepancy Reporting Procedure
RHIC-MAG-Q-1000	Procedure for Control of Measurement Test Equipment

3 Requirements:

3.1 Material & Equipment

3.1.1 Material

PVC Gloves	BNL Stock No.	K-62647 (medium)
	BNL Stock No.	K-62649 (large)
Plastic Mixing Cups	BNL Stock No.	I-80567

3.1.2 Equipment

Lamination Stacking Fixture
Scale
Vernier
Engraver or Metal Stamp (.25" Characters)

3.2 Safety:

3.2.1 All lifting and handling operations requiring overhead crane operations shall be performed by holders of valid Safety Awareness Certificates. They shall also be trained and certified in the use of the appropriate lifting device by the Cognizant Engineer or Technical Supervisor.

3.2.2 Hard hats are required when the overhead crane is in use. Failure to observe this caution may result in head injury.

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3.2.3 Operators shall wear PVC gloves when handling epoxies.

3.2.4 Operators shall wear safety glasses with side shields or goggles.

3.3 Procedure:

3.3.1 Preparation

3.3.1.1 Weigh out two groups of End Yoke Lamination 12011039 each weighing 143.5 ± 1.5 lbs. Each group should consist of an equal quantity of notch and no-notch laminations. Approximate quantity for each group is 113. Identify each group as Lead or Non-Lead End. Record weight of each group in traveler.

3.3.1.2 Weigh out 2540.5 ± 2.0 lbs. of Center Yoke Lamination 12011061. Amount should consist of an equal quantity of notch and no-notch laminations. Approximate quantity is 1468. Record weight in traveler. Note: A second group of Center Yoke laminations will be counted out later to shim the Yoke Stack to the correct height.

3.3.1.3 Count out approximately 214 End Spacer Lamination 12011040. From these make two stacks of laminations $6.75+0.0$ /- .04 inches in height.

3.3.1.4 Count out (17) center yoke laminations. Record weight of stack in traveler. Keep stack separate from other Center Yoke Laminations.

3.3.1.5 Weigh End Welded Lamination Stack 12011082 and record in traveler.

3.3.2 End Spacer Laminations – Lead End

3.3.2.1 Use the Lead End stack of end spacer laminations.

3.3.2.2 With the Coil Assembly in a horizontal position, assemble the stack of end spacer laminations over the coil assembly.

3.3.3 Center Yoke Laminations – Lead End

3.3.3.1 Use the stack of (17) center yoke laminations.

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- 3.3.3.2 Assemble the (17) center yoke laminations over the coil assembly. Align the 1.560" slot on all the laminations.
- 3.3.4 Coil and End Plate Assembly
 - 3.3.4.1 Visually inspect Coil Assembly for damage.
 - 3.3.4.2 Feed conductors through end plate and locate to Coil Assembly. Use locating pin from Coil Assembly to orient End Plate. Do not bend or kink conductors. Conductors must extend straight out from tube.
 - 3.3.4.3 Install (8) MS16995-63 Socket Head Cap Screws through end plate to coil. Torque to 195 in-lb.

Caution

Prior to installation verify that screws are the correct lengths. Overlength screws may extend into the coil block channel and damage the coil winding.

- 3.3.4.4 Engrave or Metal stamp 12011103 assembly dash # in two places as shown on print 12011103 in .25 high characters.
- 3.3.5 Yoke Stacking
 - 3.3.5.1 Set up Coil Lamination Stacking Fixture for Yoke Stacking per drawing 25.1737.01.

Note

Verify that the bottom plate of the fixture is oriented for the particular yoke stacking assembly being built.

- 3.3.5.2 Attach rigging and lifting bar to assembly on the end opposite the end plate for crane lift.
- 3.3.5.3 Lift the assembly and lower onto the Coil Lamination Stacking Fixture. Take precautions to protect the coil leads.

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3.3.5.4 Adjust the installed laminations to align the 1.560” slot with the guide rail on the Lamination Stacking fixture.

3.3.5.5 Remove rigging.

3.3.6 End Yoke Laminations – Lead End

3.3.6.1 Use the Lead End group of end yoke laminations.

3.3.6.2 Place a 1” stack of End Yoke Laminations on the loading table.

Note

Alternate groups of 16 notch /no-notch laminations when stacking.

3.3.6.3 Move the lamination-loading tray over the laminations and lift them from the table. Align the 1.560” slot on all the laminations.

3.3.6.4 Move the Lamination Loading Tray into the lowering position. Align the 1.560” slot with the guide rail on the Lamination Stacking fixture and lower the laminations.

WARNING

Keep clear of lamination loading tray. The tray has a counter-balance Weight and will automatically lower the laminations. Once the tray is fully lowered, the laminations are automatically released and the tray will spring back up to the top of the lamination-loading fixture.

3.3.6.5 Repeat paragraphs 3.3.6.2 through 3.3.6.4 until the stack of pre-weighed End Yoke Laminations is installed.

3.3.7 Check that the End Spacer Laminations are flush or below the stack of End Yoke laminations to the nearest lamination. Adjust the quantity of End Spacer Laminations as required.

3.3.8 Center Yoke Laminations - Coil Center

3.3.8.1 Use the stack of Center Yoke Laminations.

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3.3.8.2 Place a 1” stack of Center Yoke Laminations on the loading table.

Note

Alternate groups of 16 notch /no-notch laminations when stacking.

3.3.8.3 Move the lamination-loading tray over the laminations and lift them from the table. Align the 1.560” slot on all the laminations.

3.3.8.4 Move the Lamination Loading Tray into the lowering position. Align the 1.560” slot with the guide rail on the Lamination Stacking fixture and lower the laminations.

WARNING

Keep clear of lamination loading tray. The tray has a counter-balance weight and will automatically lower the laminations. Once the tray is fully lowered, the laminations are automatically released and the tray will spring back up to the top of the lamination-loading fixture.

3.3.8.5 Repeat paragraphs 3.3.8.2 through 3.3.8.4 until the stack of pre-weighed Center Yoke Laminations is installed.

3.3.8.6 Measure distance from top of last Center Yoke Lamination to non-lead end of outer coil. Count out a sufficient number of additional Center Yoke laminations to bring this dimension to $7.96 \pm .04$. Record weight of these additional laminations in traveler.

3.3.8.7 Repeat 3.3.8.2-3.3.8.4 to add this additional amount of laminations.

3.3.9 End Spacer Laminations - Non-Lead End

3.3.9.1 Place a 1” stack of End Spacer Laminations on the loading table.

3.3.9.2 Move the lamination-loading tray over the laminations and lift them from the table.

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- 3.3.9.3 Move the Lamination Loading Tray into the lowering position and lower the laminations

WARNING

Keep clear of lamination loading tray. The tray has a counter-balance weight and will automatically lower the laminations. Once the tray is fully lowered, the laminations are automatically released and the tray will spring back up to the top of the lamination-loading fixture.

- 3.3.9.4 Repeat paragraphs 3.3.9.1 through 3.3.9.3 until the stack of pre-weighed Center Yoke Laminations is installed.

- 3.3.10 End Yoke Laminations - Non-Lead End

- 3.3.10.1 Repeat paragraph 3.3.6 with Non-Lead End stack.

- 3.3.10.2 When complete, check that the End Spacer Laminations are flush or below the stack of End Yoke laminations to the nearest lamination. Adjust the quantity of End Spacer Laminations as required.

- 3.3.11 End Welded Lamination Stack

- 3.3.11.1 Place End Welded Lamination Stack Assembly onto the lamination-loading table of the Lamination Stacking fixture.

- 3.3.11.2 Move the lamination-loading tray over the stack and lift it from the table. Align the 1.560" slot on the stack.

- 3.3.11.3 Move the Lamination Loading Tray into the lowering position. Align the 1.560" slot with the guide rail on the Lamination Stacking fixture and lower the lamination stack.

WARNING

Keep clear of lamination loading tray. The tray has a counter-balance weight and will automatically lower the laminations. Once the tray is fully lowered, the laminations are automatically released and the tray will spring back up to the top of the lamination-loading fixture.

- 3.3.12 Tie Rods

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- 3.3.12.1 Slide 4 tie rods down lamination stack at locations shown on drawing.
- 3.3.12.2 Secure tie rods in place on Non-Lead End of assembly with washer plates 12011090, lock washers MS35338-140, and cap screws MS16995-65.
- 3.3.12.3 Secure tie rods in place on Lead End of assembly with lock washers MS35338-140 and cap screws MS16995-67.
- 3.3.13 Inverting Coil
 - 3.3.13.1 Attach Lifting Shell and rigging to assembly for crane lift.
 - 3.3.13.2 Remove assembly from the Lamination Stacking Fixture and rest on carriage in horizontal position.
 - 3.3.13.3 Reposition rigging for lift at Lead End of coil.
 - 3.3.13.4 Lift assembly from the horizontal to the vertical attitude by the lead end and lower onto the floor stand. Lash assembly to adjacent support.
 - 3.3.13.5 Detach rigging used for crane lift.
- 3.3.14 Lead Insulators
 - 3.3.14.1 Install lead insulators 6 places over coil leads as shown on drawing. Bond to assembly using 5-minute epoxy to prevent leakage of the 2850FT used in the next step.
 - 3.3.14.2 Fill space between through holes in lead insulators and coil leads with 2850FT epoxy.

Note 1

Mix ratio of epoxy is 100 grams of 2850FT epoxy to 7.5 grams hardener. Pot life is 30 minutes at room temperature.

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Note 2

No epoxy allowed between coil assembly and lead insulators.

- 3.3.15 Identification
 - 3.3.15.1 Rubber stamp assembly with 12011097 part number including dash number and applicable revision letter at location shown on drawing.
- 3.3.16 Coil Assembly Removal
 - 3.3.16.1 Check that epoxy has set-up before lifting coil.
 - 3.3.16.2 Attach lifting shell and rigging to assembly for crane lift.
 - 3.3.16.3 Remove assembly from stand and rest on carriage in horizontal position
 - 3.3.16.4 Detach rigging used for crane lift.
- 4. Quality Assurance Provisions:
 - 4.1 The Quality Assurance provisions of this procedure require that the technician shall be responsible for performing all assembly operations in compliance with the procedural instructions contained herein and the recording of the results on the production traveler.
 - 4.2 The technician is responsible for notifying the technical supervisor and/or the cognizant engineer of any discrepancies occurring during the performance of this procedure. All discrepancies shall be identified and reported in accordance with RHIC- MAG-Q-1004.
 - 4.3 Measuring and test equipment used for this procedure shall contain a valid calibration label in accordance with RHIC-MAG-Q-1000.

5. Preparation for Delivery:

N/A